

Miniaturized, High Flow, Low Dead Volume Pre-Concentrator for Trace Contaminants in Water under Microgravity Conditions, Phase I

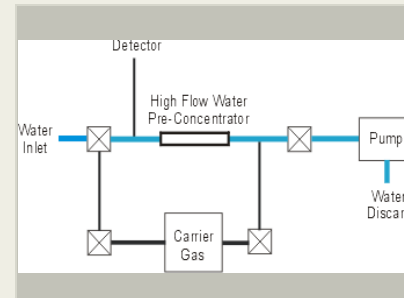
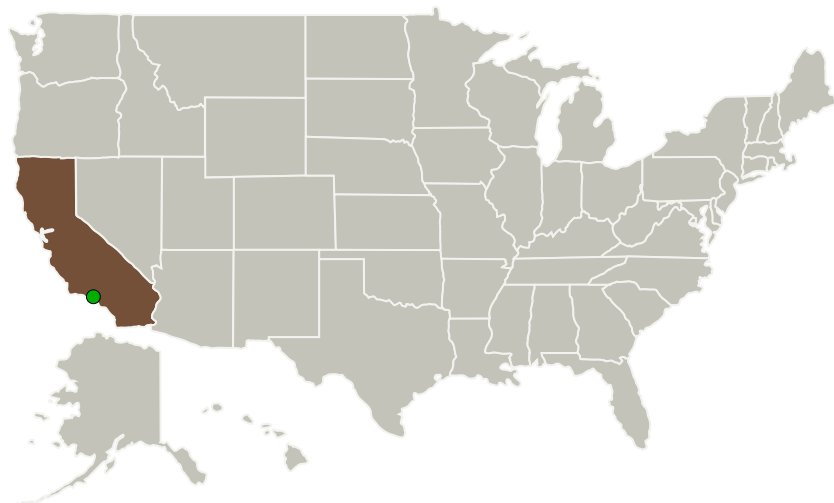
Completed Technology Project (2013 - 2013)



Project Introduction

Thorleaf Research, Inc. proposes to develop a miniaturized high flow, low dead-volume pre-concentrator for monitoring trace levels of contaminants in water under microgravity conditions. Our innovative design for the pre-concentrator assembly combines high water sampling flow rates with low dead volume in the device, enhancing pre-concentration while avoiding cavitation effects. This will help meet monitoring needs for NASA's Spacecraft Water Exposure Guidelines (SWEGs). Although miniaturized mass spectrometers and other detectors are under development by NASA, the potential of such instrumentation to meet NASA needs will not be realized without complementary developments in the technology for collecting and preparing samples for in situ measurements. Based on our analysis, we project that it will be possible to develop a miniaturized water pre-concentrator module with a mass on the order of 0.5 kg and an average power consumption of <1 watt, depending on the configuration selected. Our goal in the proposed SBIR Phase I effort is to demonstrate feasibility for such a system and to develop a detailed design for fabricating and demonstrating prototypes in Phase II.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Thorleaf Research, Inc.	Lead Organization	Industry	Santa Barbara, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

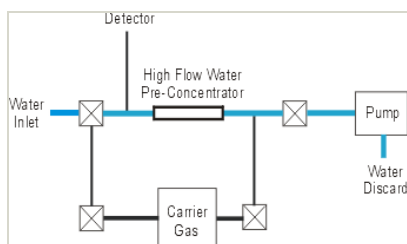
Project Transitions

**May 2013:** Project Start**November 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140702>)

Images



Project Image

Miniaturized, High Flow, Low Dead Volume Pre-Concentrator for Trace Contaminants in Water under Microgravity Conditions
(<https://techport.nasa.gov/image/128171>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Thorleaf Research, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

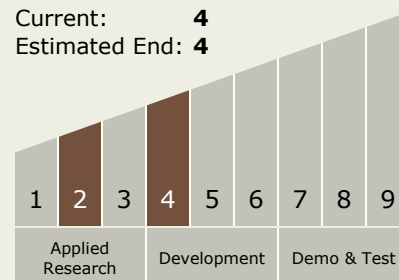
Carlos Torrez

Principal Investigator:

Paul Holland

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.4 Environmental Monitoring, Safety, and Emergency Response
 - └ TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System